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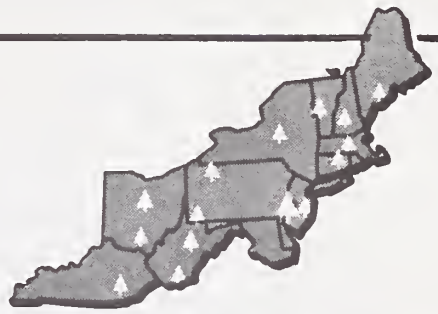

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USE OF A PHEROMONE TO CAUSE COPULATION BETWEEN TWO SPECIES OF CERAMBYCIDS

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Abstract. The painted hickory borer, *Megacyllene caryae* (Gahan) and the locust borer *Megacyllene robiniae* (Forster) will not attempt to interbreed in the laboratory. However, male locust borers copulated with painted hickory borer females painted with an alcohol extract of female locust borers. No eggs were laid by treated or untreated beetles, though females were full of eggs. A bacillus disease may have prevented egg deposition.

Recent interest in the potential of sterile hybrids for pest control (LaChance and Ruud 1979; Pal and Whitten 1974) prompted me to try interbreeding the locust borer, *Megacyllene robiniae* (Forster), and the painted hickory borer, *Megacyllene caryae* (Gahan). The painted hickory borer and the locust borer are cerambycids that are hardly distinguishable in the adult stage. In nature, hickory borers emerge in spring and locust borers in late summer.

A few years ago, when artificially rearing the locust borer and painted hickory borer (Galford 1969), I attempted interbreeding the two species by confining the opposite sexes. However, the beetles made no attempt to mate. Subsequently I found that the locust borer female has a pheromone (Galford 1977) that she deposits on the host tree, alerting incoming males of her presence and causing them to search that tree. The painted hickory borer female also produces a pheromone that functions the same way (unpublished).

Heintz (1925) stated that males of some species of Lepturini recognized females only when they touched them with their antennae. Laboratory observations of the sexual behavior of several species of cerambycids led me to believe that males can immediately sense whether they have touched a male or female. These observations plus knowledge of the locust borer and painted hickory borer pheromones prompted a different approach to interbreed the painted hickory borer and locust borer.

MATERIALS AND METHODS

The painted hickory borers were reared on an artificial medium (Galford 1969). Locust borers were collected in September from goldenrod flowers at Delaware, Ohio.

Thirty female locust borers were washed in 30 ml of 190 proof ethanol ca 5 minutes to obtain the pheromone. The extract was heated and held at 70°C until the volume was reduced to 2 ml or 15 female equivalents per ml. A small artist brush was used to paint the locust borer extract onto the bodies of six painted hickory borer females. All parts of the body and appendages were painted.

Treated female hickory borers were placed singly in 4-liter jars along with hickory bolts, *Carya* spp., wrapped with cotton bias tape to provide oviposition sites. The bolts were dabbed with some of the locust borer extract. Three male locust borers were then introduced into each jar. Three additional jars with the untreated female and male hickory borers were used as checks. The activity of the beetles was observed and recorded. After 5 days the bias tape was removed from the bolts to check for eggs.

RESULTS AND DISCUSSION

Locust borer males immediately detected the pheromone dabbed on the bolts of wood and began searching for females. Some of the treated painted hickory borer females copulated with locust borer males within a few minutes while others did not copulate for almost an hour. In some instances, males did not react to a female when they initially touched a part of her body. Apparently the extract was heavier on some body parts than others. However, all the treated females copulated eventually. The females made no attempt to fight off males, so the two species were sexually compatible. The untreated females and males readily copulated.

No eggs were laid by treated or untreated females. Unfortunately, it is not known what the results might have been, because the beetles were infected with a bacillus disease which may have prevented them from laying eggs. Stock laboratory cultures of painted hickory borers and another cerambycid species died out completely due to the disease. Although females were full of eggs and mated, they failed to lay any eggs before they died.

The use of pheromones to cause interbreeding among insects could lead to many useful studies in genetics and control.

LITERATURE CITED

Galford, J. R.
1969. Artificial rearing of 10 species of woodboring insects. USDA For. Serv. Res. Note NE-102. 6 p.

Galford, J. R.
1977. Evidence for a pheromone in the locust borer. USDA For Serv. Res. Note NE-240. 3 p.

Heintz, A.
1925. Lepturinernas blombesök. Entomol. Tidsker. 46:21-34.

LaChance, L. E., and Rita L. Ruud.
1979. Interstrain and interspecific crosses between *Pectinophora gossypiella* and *P. scutigera*. J. Econ. Entomol. 72:618-20.

Pal, R., and M. J. Whitten, eds.
1974. The use of genetics in insect control. Elsevier Press, New York. 241 p.

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